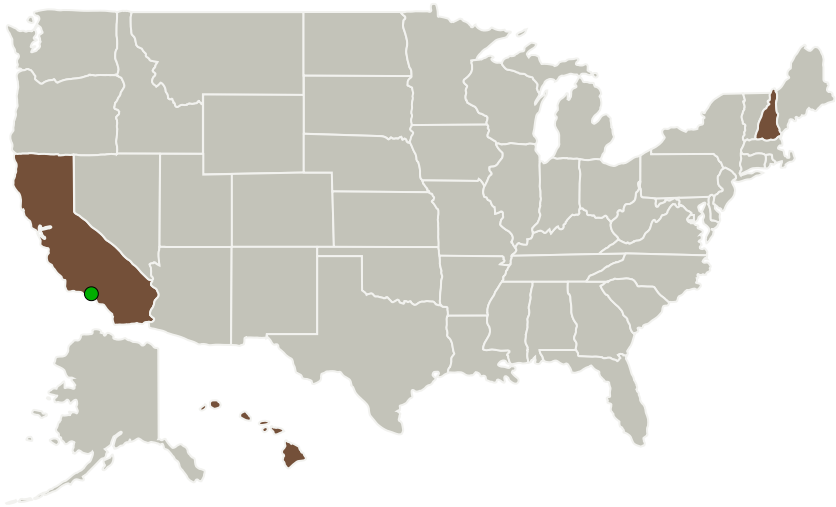
Accurate, Miniature Attitude Determination System, Phase I

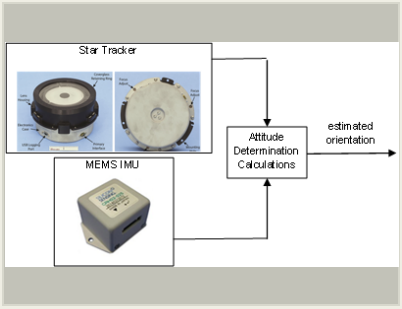
Completed Technology Project (2017 - 2018)

Project Introduction

The overall goal of this project is to design, develop, and demonstrate using a flight test, a miniature, high accuracy attitude determination system (ADS) for use on small satellites. Currently available ADS are too large and heavy, or, units for small satellites do not have sensors with sufficient accuracy for important applications such as formation flying or laser-based communication systems. We will overcome these limits by combining two technologies that Creare has previously demonstrated: a 1/2U-sized, high accuracy star tracker; and MEMS inertial measurement unit (IMU). The star tracker relies on unique optics technology that allows the implementation of telescope-quality optics in approximately 1/2U CubeSat and the MEMS IMU has near laser gyro accuracy in a package that is significantly smaller and less expensive than traditional IMUs. During the Phase I feasibility demonstration, we will clearly illustrate the advantages of our approach. Creare and our academic partner, University of Hawaii Spaceflight Laboratory (HSFL), are well qualified to succeed in this effort given our considerable and unique past experience in miniaturizing devices for use in important space missions, our firm's longevity, the space-qualified fabrication facilities that we maintain, and HSFL's unique ground and space testing environments. The proposed program provides an opportunity to accelerate the demonstration of new technology that will greatly enhance the capabilities of small satellites in a spaceflight mission during the Phase II project and within the Phase II budget.

Primary U.S. Work Locations and Key Partners





Accurate, Miniature Attitude Determination System, Phase I Briefing Chart Image

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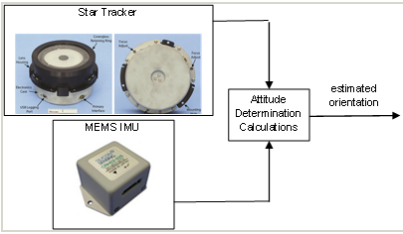
Organizations Performing Work	Role	Type	Location
Creare LLC	Lead Organization	Industry	Hanover, New Hampshire
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California
University of Hawaii Maui College	Supporting Organization	Academia Alaska Native and Native Hawaiian Serving Institutions (ANNH), Asian American Native American Pacific Islander (AANAPISI)	Kahului, Hawaii

Primary U.S. Work Locations	
California	Hawaii
New Hampshire	

Images



Briefing Chart Image
Accurate, Miniature Attitude Determination System, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/131509)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Creare LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

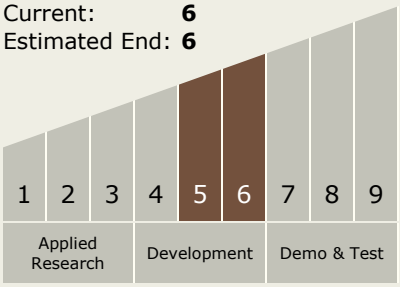
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Brynmor Davis

Technology Maturity (TRL)

Start: **5**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.4 Attitude Estimation Technologies
    - TX17.4.3 Attitude Estimation Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System